# KPMG

# Game Changer

## The Impact of Cognitive Technology on Business and Financial Reporting
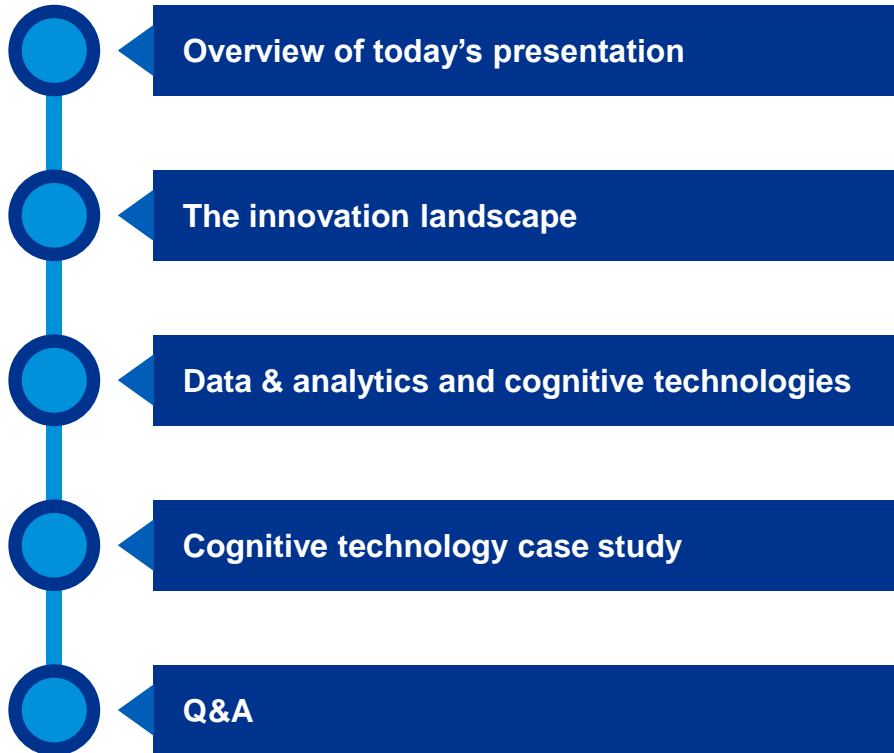
**May 23, 2016**

# Today's presenter

**Marc Macaulay, Cognitive Technology Audit Leader, KPMG LLP**

Marc Macaulay is KPMG's Cognitive Technology Audit Leader where he is responsible for the development and implementation of a national cognitive technology strategy in support of the firm's Audit practice. The Cognitive Technology Initiative is part of a broader effort to support the firm's commitment to fostering innovation, developing new service capabilities and advancing audit quality. Marc's background includes serving as lead audit partner on some of the firm's most prominent financial services clients. Marc previously headed the firm's Western Area Financial Services Industry team, and prior to that, was a member of KPMG's Department of Professional Practice with a focus on financial instruments, derivatives, leasing, bank regulation, consolidations and business combinations. Marc sits on the board of several major charitable organizations and is a regular conference speaker on topics such as corporate governance, risk, controls, derivatives, and financial instruments.

# Presentation agenda

**Overview of today's presentation**

**The innovation landscape**

**Data & analytics and cognitive technologies**

**Cognitive technology case study**

**Q&A**

# Overview of today's presentation

***Game Changer – The Impact of Cognitive Technology on Business and Financial Reporting***

Today's session will present an overview of cognitive technology and its broad implications for businesses and financial reporting.  The presentation will explore how cognitive technology will transform the way data is understood and used, and the opportunities for enhancing audit quality.

The session will also feature a case study describing how KPMG is using the processing power and learning capacity of cognitive technology to evaluate select areas of a financial organization's asset portfolio.

# The innovation landscape

# Changing the way business is done

**$152.7 billion**

The global market for robots and artificial intelligence is expected to reach $152.7 billion by 2020. The adoption of these technologies could improve productivity by 30 percent. *Bank of America Merrill Lynch*

**55 %**

A recent study by *HfS Research* and *KPMG LLP* reports that 55 percent of North American enterprises are looking at new opportunities available with RPA systems.

Recent research from *London School of Economics* suggests a return on investment in robotic technologies of between 600% and 800% for specific tasks.

**600 %** and **800 %** ROI

*Markets and Markets* estimates that the AI, or cognitive computing marketplace, will generate revenue of
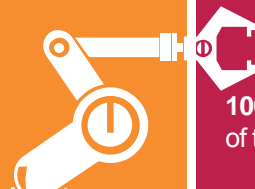
**$12.5 billion by 2019**

**$14.9 billion**

**$1.7 billion**

According to *Quid*, from 2010 to 2014, private investment in AI has grown from $1.7 billion to $14.9 billion, and was on track to grow nearly 50 percent year-on-year in 2015 alone.

**Top 5**

*Gartner* predicts that by 2020, smart machines will be a top five investment priority for more than 30% of CIOs.

*McKinsey* research suggests that smart robots will replace more than **100 million knowledge workers** – or one-third of the world's jobs – by 2025.

# Audit 2020: A focus on change

**93%** of survey respondents believe **"Audit needs to better embrace technology"**

**58% say** Technology has the greatest impact on the audit profession

**WHAT EXTERNAL FORCE WILL BE KEY?**

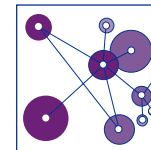**Three-out-of-four auditors** rank the audit profession as on par or behind in technology with its clients and other industries

**Most cited benefits of technology are**

**59%** Increased efficiency

**58%** Better tools for sophisticated analysis

**HOW WILL AUDIT TRANSFORM?**

**53% say** **Data & analytics** is transforming how audits are conducted, enhancing audit quality and effectiveness

**CHALLENGES**

**66%** See Culture

**59%** See Regulatory Environment

as the biggest challenges to enhancing the role of audit

**Forbes INSIGHTS**

kpmg.com/us/audit
Based on a survey of 151 U.S.-based respondents, including audit committee chairs and members, C-level financial executives, external auditors, accounting professors and accounting students.

# Guiding principles
## Generating deeper insights through innovation

**Professionalism** – Drive quality

**Perspective –** Develop valuable independent perspective that can be shared with the capital markets
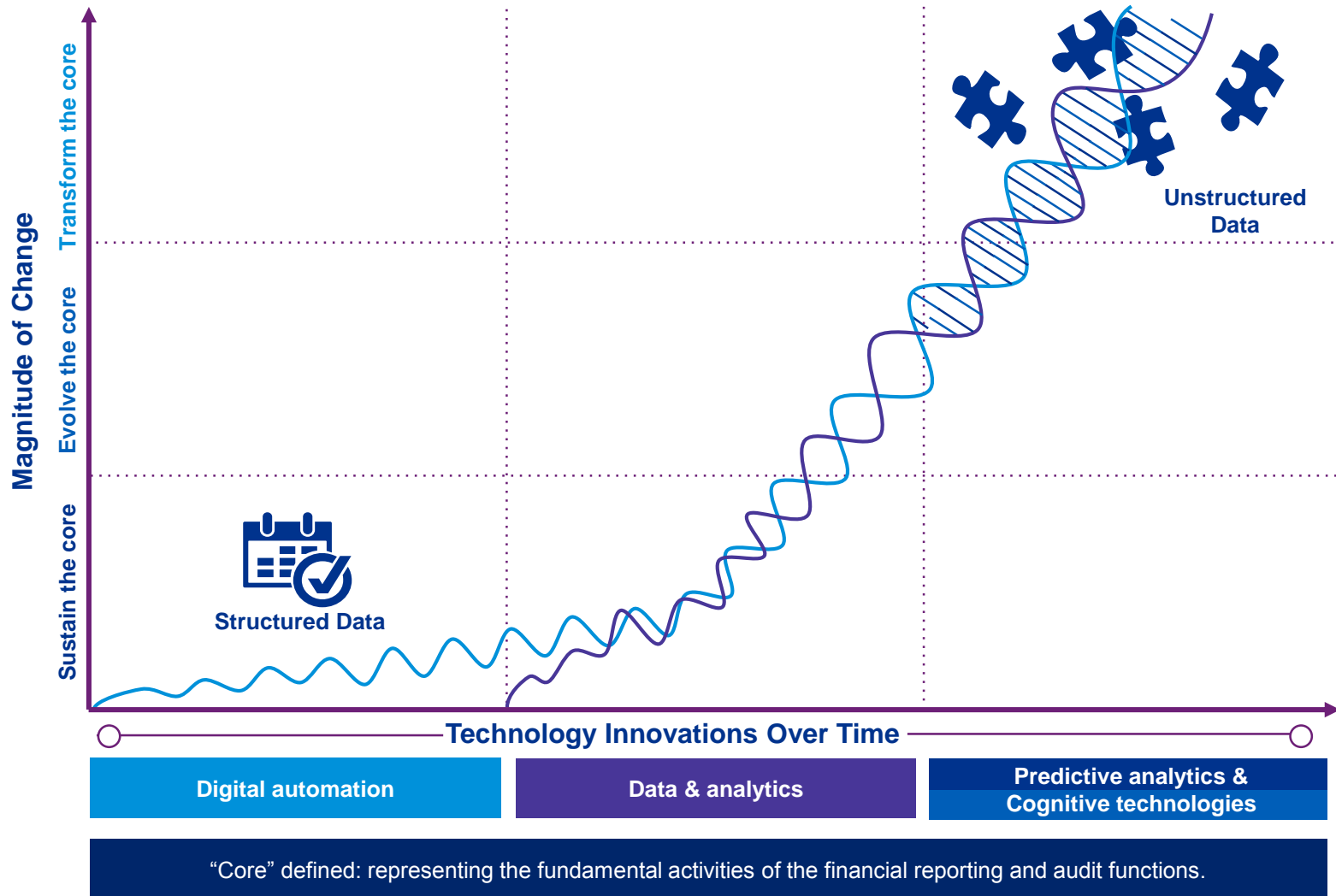
**People –** Inspire confidence and empower your people to drive engagement and high performance

**Performance** – Drive performance improvement in operations and business process

# The innovation journey



Magnitude of Change
- Transform the core
- Evolve the core
- Sustain the core

Structured Data

Unstructured Data

Technology Innovations Over Time

| Digital automation | Data & analytics | Predictive analytics & Cognitive technologies |

"Core" defined: representing the fundamental activities of the financial reporting and audit functions.

# Data & analytics and cognitive technologies

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# Effective application of data & analytics and cognitive technologies

## Predictive analytics

Using the data captured in the audit and combining it with an analysis of industry or market data enables a deeper more robust understanding of potential business risks. The advanced technologies that make this possible will evolve through robotics and machine learning and provide auditors with additional analytical capabilities and knowledge.

## Digital automation

Digital automation allows for effective information extraction from company systems to evaluate larger data sets and to conduct a more granular analysis of underlying evidence. This supports the auditors' ability to assess control risks, identify unique transactions and pinpoint data or performance anomalies.

## Cognitive technologies

Cognitive technology will fundamentally affect how audit information is used and understood by enabling the analysis of larger volumes of both structured and unstructured data, and as a result, allowing auditors to dig deeper into financial information enabling a more detailed and comprehensive audit.

**Predictive analytics**

**Data & analytics**

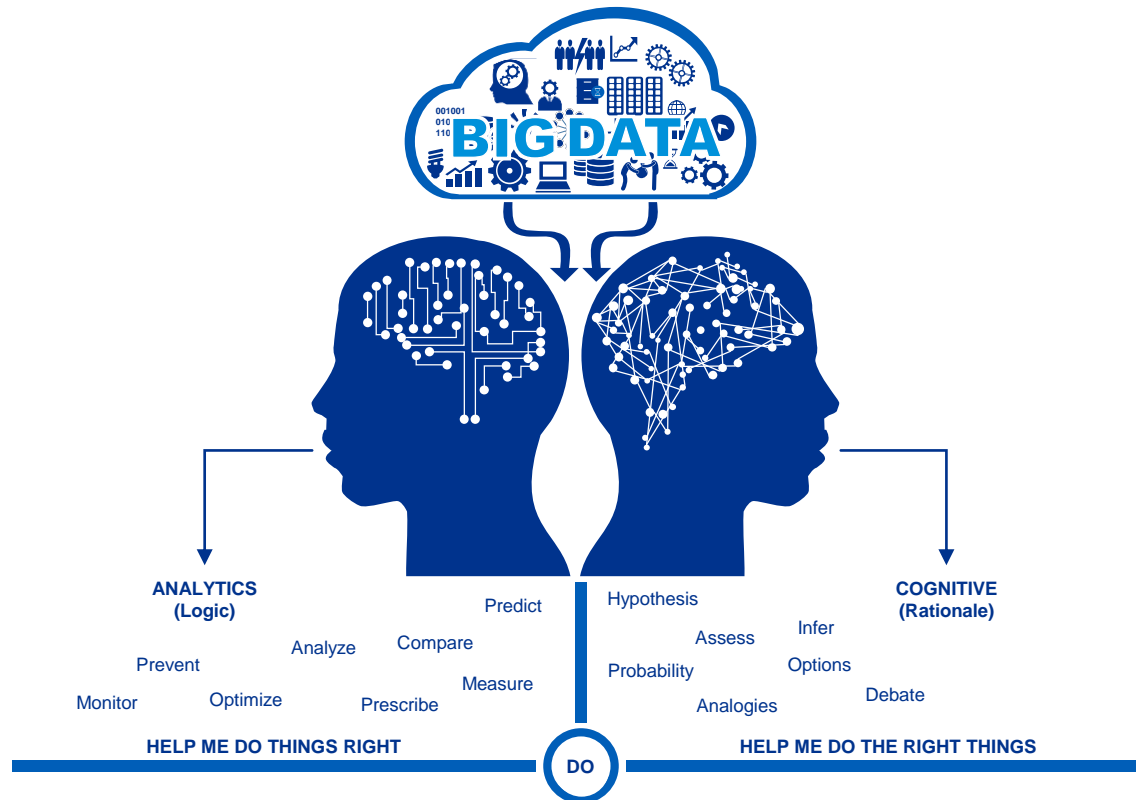**Digital automation**

**Cognitive technologies**

*Unprecedented advances in computing technology are fundamentally changing the way audits are conducted. Automation and cognitive technologies provide a foundation for bringing greater insights and a different perspective to a continued focus on audit quality.*

# Cognitive technologies defined

- Cognitive technologies are the confluence of many technologies, which combine to interact, learn, and simulate decision-making the way a human does – by analyzing data, generating hypotheses, and evaluating supporting evidence to levy judgment based decisions.

- Audit innovation through investments in cognitive technologies will further the ongoing mandate to enhance audit quality. Cognitive technology will enable auditors, and for that matter financial reporting professionals more broadly, to analyze more of an organization's financial and operational data – structured and unstructured – transforming from traditional sampling techniques that have been in place for decades to evaluations of complete data populations, thereby leveraging technology to continue focusing on audit quality.
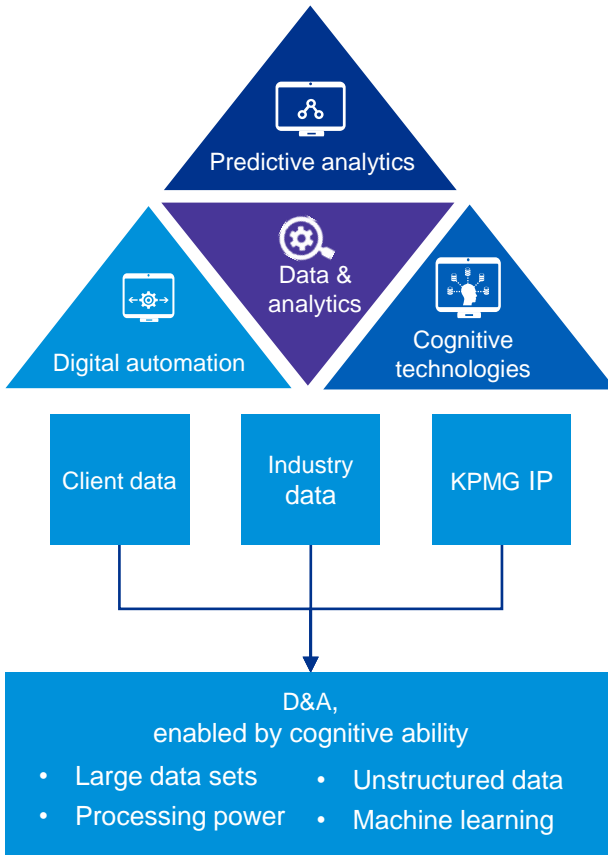
Analyze data

Generate hypothesis

Evaluate evidence

**Cognitive technology**

Judgment based decisions

Business insights

Transforming sampling techniques

# Data & analytics and cognitive technologies dynamics



**BIG DATA**

**ANALYTICS (Logic)**

Predict
Analyze
Compare
Prevent
Monitor
Optimize
Prescribe
Measure

**HELP ME DO THINGS RIGHT**

**DO**

Hypothesis
Assess
Infer
Probability
Options
Analogies
Debate

**COGNITIVE (Rationale)**

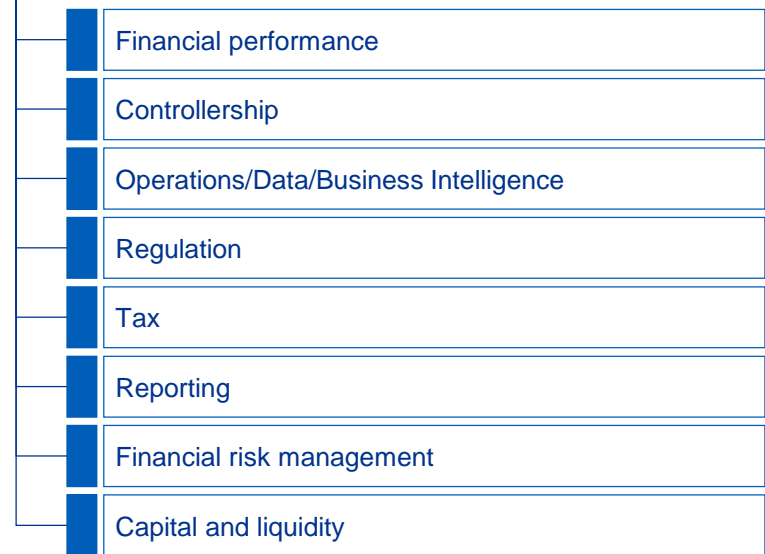**HELP ME DO THE RIGHT THINGS**

In today's technology landscape, data & analytics are typically based on deterministic, programmable software, where cognitive technology is based on natural language processing and probabilistic reasoning. Thus, cognitive and data & analytics are highly complementary approaches to addressing a wide array of the most challenging issues we are faced with today. In practice, cognitive and data & analytics are different but synergistic, working together they can generate greater analytical depth and more useful insights from audit procedures.

# Innovation drives powerful insights

## Audit innovation



Predictive analytics

Data & analytics

Digital automation

Cognitive technologies

Client data

Industry data

KPMG IP

**D&A,**
**enabled by cognitive ability**

- Large data sets
- Processing power
- Unstructured data
- Machine learning

## Financial executive agenda

- Financial performance
- Controllership
- Operations/Data/Business Intelligence
- Regulation
- Tax
- Reporting
- Financial risk management
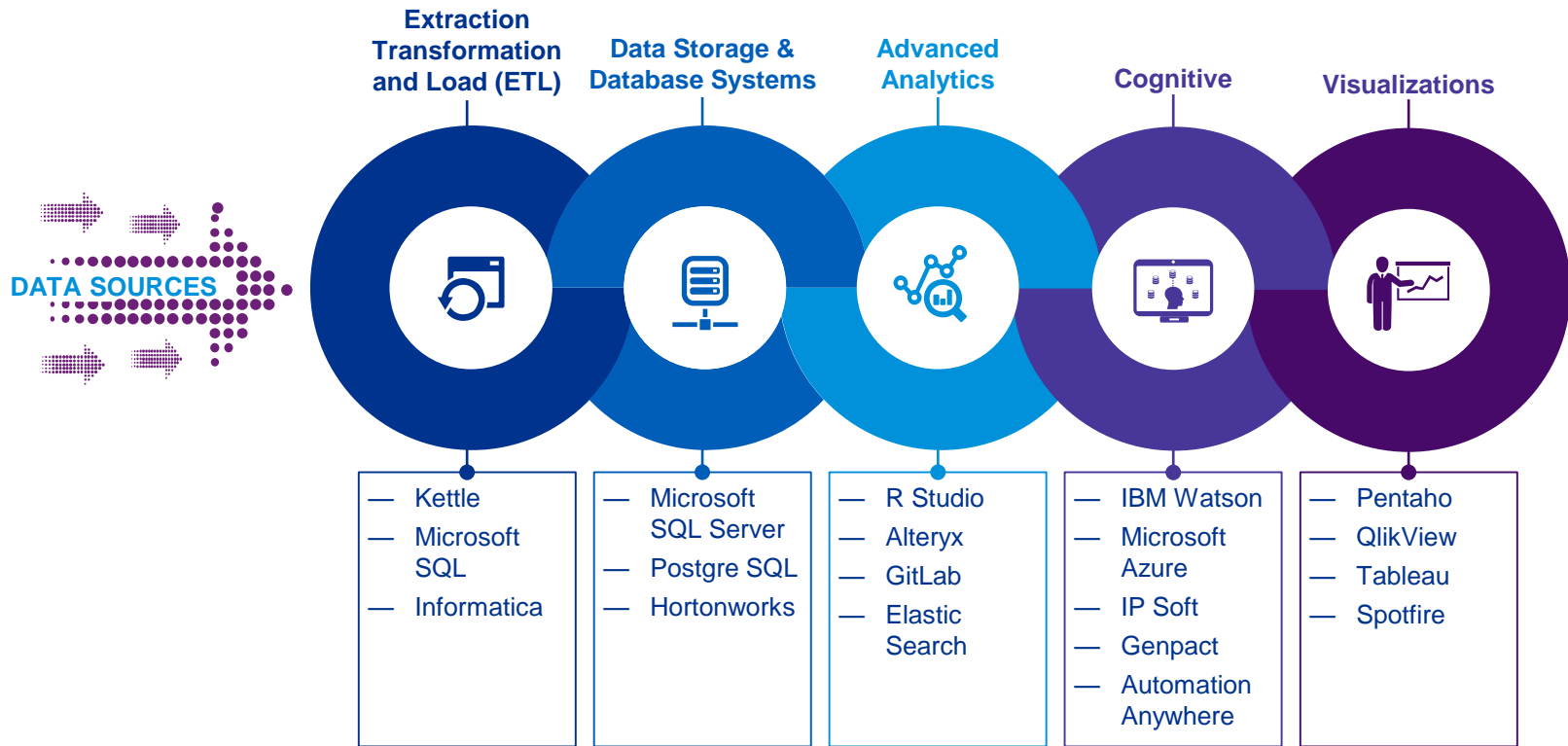- Capital and liquidity

### *Outcomes*

- Identification of outliers, anomalies, and patterns
- Digitally enabled specialist judgment
- Earlier indicators of control risk
- Deep industry insights and perspective regarding the financial executive's agenda
- Scenario analysis/stress testing
- Client trends and aberrations

# What are some of the technologies being used?

**EXAMPLE TECHNOLOGY ELEMENTS:** BIG DATA TECHNOLOGY PLATFORM

**Extraction Transformation and Load (ETL)**

**Data Storage & Database Systems**

**Advanced Analytics**

**Cognitive**

**Visualizations**

**DATA SOURCES**

| Extraction Transformation and Load (ETL) | Data Storage & Database Systems | Advanced Analytics | Cognitive | Visualizations |
|---|---|---|---|---|
| — Kettle | — Microsoft SQL Server | — R Studio | — IBM Watson | — Pentaho |
| — Microsoft SQL | — Postgre SQL | — Alteryx | — Microsoft Azure | — QlikView |
| — Informatica | — Hortonworks | — GitLab | — IP Soft | — Tableau |
| | | — Elastic Search | — Genpact | — Spotfire |
| | | | — Automation Anywhere | |

# KPMG

# Case study:

## Commercial Mortgage Loan Analysis (CMLA) Pilot

**Case study**

# KPMG's Partnership with IBM - Watson



IBM has a rich history of combining innovations to create cutting edge technologies. Watson integrates machine learning and other artificial intelligence technologies into a scalable system that can be accessed through a range of applications.

Auditors are increasingly challenged with tackling immense volumes of unstructured data. Cognitive technologies such as Watson can transform how this data is understood and how critical decisions are made.

KPMG is taking a forward looking approach to extending its capabilities, enhancing audit quality, and helping its professionals and organizations gain new insights from critical enterprise information.

# Commercial Mortgage Loan Analysis (CMLA) Pilot

## Pilot Overview

- Pilot objective was for IBM-Watson to process an entire Credit File for each loan, along with relevant external information and KPMG IP

- Through KPMG training of IBM-Watson, key elements impacting loan grade were identified

- Utilizing KPMG's proprietary loan grading process, IBM-Watson determined the loan grade

- Each loan grade was be accompanied by:

  – Confidence level

  – Supporting information, extracted from Credit File (no client confidential information is retained)

# CMLA Pilot

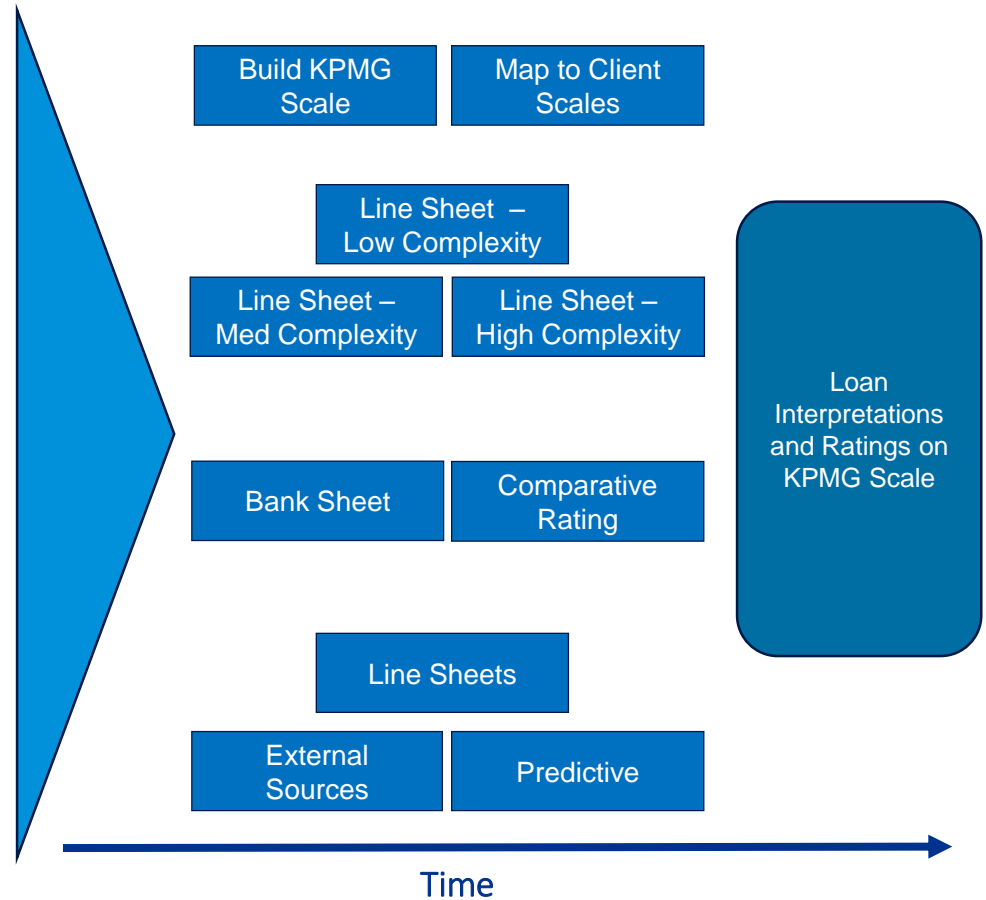## The Audit Assist use case has multiple components geared towards improving audit quality

**CREDIT FILE REVIEW SPECIALIST**

**AUDIT SENIOR MANAGER**

- **KPMG SCALE:** Client rating systems analyzed and combined into a universal credit risk rating scale that can be used to rate all loans and map back to client scales.

- **CREDIT FILE REVIEW:** Reasoning tools to extract attributes from credit file for current loan and complete calculations and analyses.

- **AGGREGATED PORTFOLIO ANALYSIS:** Compare current loans to KPMG's repository of line sheets and loan data in order to surface typical quantitative ranges for key attributes at each rating level.

- **MACRO CREDIT INSIGHTS:** Provide tools to review the full history of completed line sheets and loan data, and compare to public data, in order to analyze credit quality shifts by industry and sector.

| Build KPMG Scale | Map to Client Scales |
|---|---|

| Line Sheet – Low Complexity | |
|---|---|
| Line Sheet – Med Complexity | Line Sheet – High Complexity |

| Bank Sheet | Comparative Rating |
|---|---|

**Loan Interpretations and Ratings on KPMG Scale**

| Line Sheets |
|---|

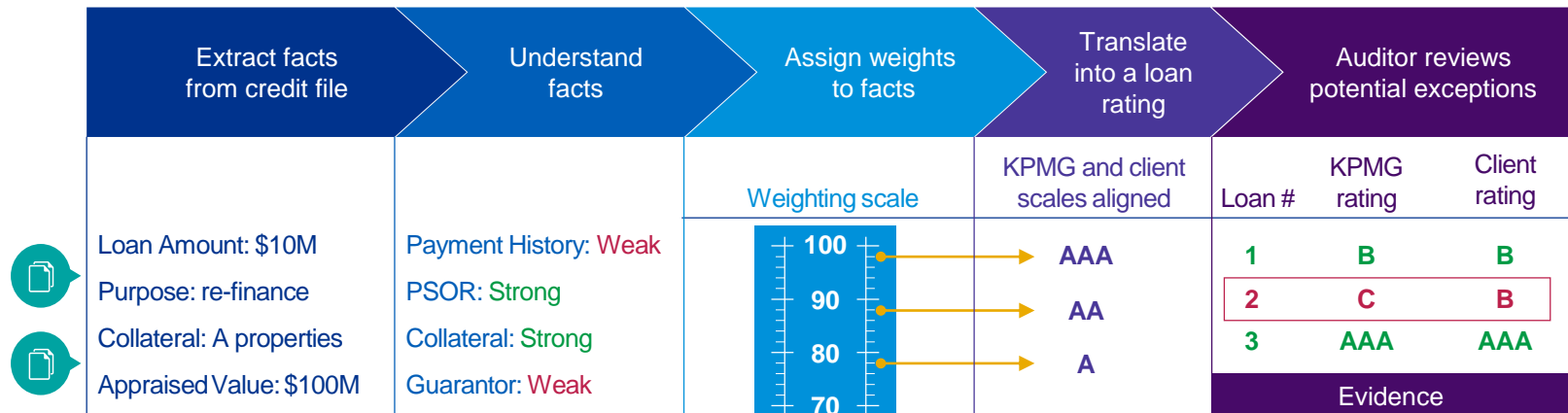| External Sources | Predictive |
|---|---|

**Time**

**Case study**

# Audit and cognitive technologies

By scaling human skills and judgment through the application of cognitive technology across a bank's commercial mortgage loan portfolio, auditors gained a more detailed and comprehensive understanding of the bank's credit files and potential audit exceptions based on loan grading.

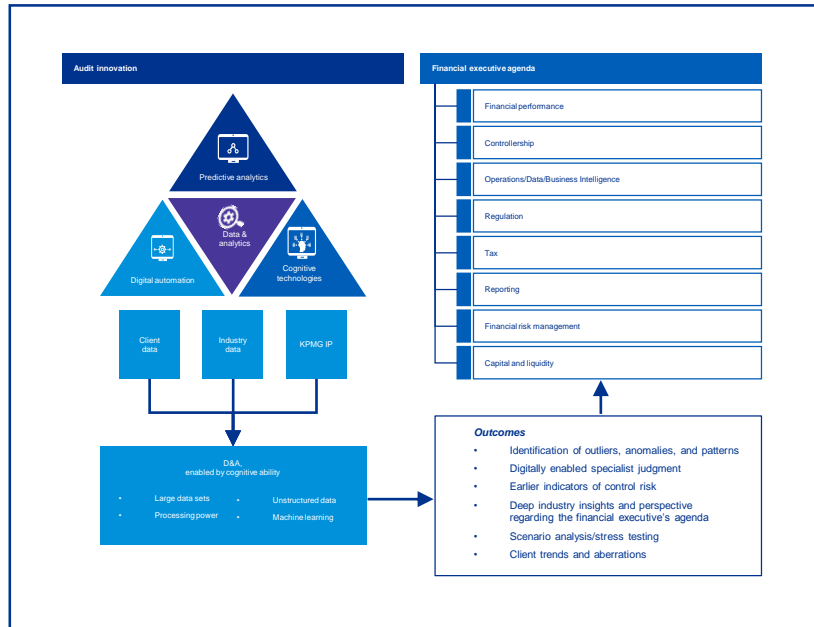**Today:** Small sample of bank's loan portfolio (~40 – 150 loans)

| Extract facts from credit file | Understand facts | Interpret against a client-specific loan grading scale |
|---|---|---|

**Future**: Larger, more complete data sets from specific loan portfolios

| Extract facts from credit file | Understand facts | Assign weights to facts | Translate into a loan rating | Auditor reviews potential exceptions |
|---|---|---|---|---|

|  |  | Weighting scale | KPMG and client scales aligned | Loan # | KPMG rating | Client rating |
|---|---|---|---|---|---|---|
| Loan Amount: $10M | Payment History: Weak | 100 | AAA | 1 | B | B |
| Purpose: re-finance | PSOR: Strong | 90 | AA | 2 | C | B |
| Collateral: A properties | Collateral: Strong | 80 | A | 3 | AAA | AAA |
| Appraised Value: $100M | Guarantor: Weak | 70 |  | | Evidence | |

*Applying these new technologies allows our auditors to assess larger data populations against complex and judgmental metrics in a highly automated and effective manner.*

# Reporting



**Digitally enabled reporting (think an App)**

## Reporting Capabilities

- Dashboard reporting
- Drill down capability
- Geography, LOB, segment, etc.

## Example Content

- Audit status
- Audit insight
  - Where we agree
  - Where we disagree
  - Why we disagree
- Insight / perspective
  - Trends based on client data
  - Industry insights
  - Macro economic / credit insights
  - Sentiment
  - Instrument specific insights

# Questions?

# Presenter's contact details

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